

## **E-LEARNING: WHAT IS IT? WHERE AND HOW DO WE USE IT? IS IT EFFECTIVE?**

**Martyn R Partridge**

Professor of Respiratory Medicine and Deputy Director of Education  
Imperial College London - United Kingdom and  
Senior Vice Dean Imperial College Nanyang Medical School, Singapore

---

The term e-learning would not have been known a few decades ago and it is variously defined. Essentially e-learning includes multiple modalities of learning opportunities including computer assisted instruction, internet based learning, distance learning and use of computers to deliver stand alone learning materials which often involve multimedia techniques and varying degrees of self assessment. More recently the term *blended learning* has been introduced and blended learning incorporates an appreciation as to how one uses e-Learning in conjunction with more traditional methods, which in medicine would involve everything from didactic lectures to apprenticeship, small group working, clinical seminars and bedside teaching. What we now have to address is why we within medicine would be interested in e-learning and to strategically think through its role and merits.

In postgraduate situations trainees increasingly have the benefit of a structured residency programme. These utilise a variety of learning opportunities but frequently involve day release and the opportunity to attend lectures and seminars. However the pressures upon clinical trainees to deliver service and the problems of shift working means that not all trainees can attend training opportunities and a facility which permits some of this training to be delivered in a self directed manner, undertaken at the trainees own rate, at a time to suit them and in an environment to suit them would be advantageous. For more senior colleagues there is increasing need to be able to demonstrate that one is remaining up to date, and over a forty year professional career the challenges and advances of medicine make this imperative. Many of us now spend a sizable amount of our working time dealing with diseases which we not even aware of in medical school. For this purpose as well, learning opportunities that can be fitted into an increasingly busy professional life are essential.

Undergraduate medical teaching is also undergoing something of a revolution. There are numerous pressures on medical schools which are making it increasingly difficult to deliver a medical curriculum in the traditional way. Many schools have difficulty in delivering traditional teaching on structure and function and the decline in availability of anatomists and physiologists have meant that these subjects are increasingly taught by clinicians, and anatomy for example increasingly taught by surgeons and radiologists. Whilst some may question the retention of these subjects in a major way within an undergraduate curriculum, others correctly point out that understanding the scientific basis of medicine remains critical if one is able to adapt to new challenges over a long professional career, and there is some evidence that medical courses that have reduced the emphasis on science produce graduates that struggle more in their post graduate examinations. A further pressure on clinical training comes from faster through put in hospitals with students being exposed to a less diverse range of diseases and conditions. Service demands upon clinicians and alteration in service configurations make it harder for students to slot into firm structure and to receive uniform learning opportunities. Whilst there are several hypothetical solutions to this problem, e-learning again represents one way of providing to students equal learning opportunities irrespective of their clinical placements and it is a cost effective way to utilise lecturers time, is easy to update, is self directed and offers an opportunity for students to self assess at frequent intervals.

E-learning formats may include:

- Internet based resources (lecture on the web)
- Discrete modules on specific subjects with interaction, multimedia and self assessment
- Interactive case histories (such as Imperial College's Virtual Patient Applications)
- Interactive management tools (simulators)
- Learning by games (for example, Second Life)
- Podcasts

In one medical school the theoretical teaching in respiratory medicine has been largely replaced by use of e-learning. The drivers for this were that 20% of deaths in the UK are due to lung disease and one disease alone (COPD) accounted for 1 in 8 of all emergency admissions to hospital. Despite this Imperial College had no respiratory medicine attachments undertaken by all students and students were more likely to receive clinical respiratory teaching from a gastroenterologist or a geriatrician than from a chest physician. Only two formal lectures in year 3 of the existing course were on chest medicine. A rational approach was therefore taken with specific interactive e-learning modules being prepared on the subjects of:

1. A rational approach to the diagnosis of respiratory disease (including use of spirometry)
2. Respiratory emergencies including pneumothorax, foreign body inhalation, acute asthma, pulmonary embolism, pneumonia and exacerbations of COPD
3. Asthma
4. Chronic Obstructive Pulmonary Disease
5. Lung cancer
6. Sarcoidosis
7. Obstructive sleep apnoea syndromes

In addition, specific virtual patient applications were prepared on tuberculosis and life threatening severe asthma and the e-portfolio archiving system also retained video clips from pre-recorded 'open rounds' where patients with clinical respiratory signs had been demonstrated. Clips are thus available for everything from a patient with a cold abscess to a patient describing the presentation of sarcoidosis with erythema nodosum and polyarthralgia.

Clearly when undertaking this exercise one has to be certain that these modules achieved that which was intended and to make them attractive for the students they included frequent self check exercises, numerous examples of radiographs and line drawings, video clips, animations and sources of further information. Experience has shown that when such modules are embedded into the curriculum (these are timetabled in the year 3 curriculum) students do utilise them, often spending a considerable amount of time on e-learning. The timetabled e-modules are followed by a face to face session in a lecture theatre where some other respiratory subject is discussed but this is followed by a clicker session where the students are asked questions about much of the ground which has been covered in the e-learning modules. As a result it is apparent which students have and have not utilised the modules!

An example of the efficacy of such modules can be shown by the fact that when 264 third year medical students were asked the commonest cause of community acquired pneumonia 96% were able to answer *streptococcus pneumoniae*. In a further study<sup>1</sup> we have been able to demonstrate in a randomised controlled trial that knowledge transfer is equivalent if the same information is offered in a didactic lecture compared with an interactive lecture compared with the same material presented in an e-learning module. In that study there was also a clear suggestion that data interpretation was better than amongst those who had utilised the e-learning modules. Others have subsequently shown the same with ECG interpretation<sup>2</sup> With regards to postgraduate trainees there is evidence that the trainees are equally receptive to the use of e-learning but they would like this to be an adjunct to their existing face to face training programmes and it is clear that they like the social interaction with other trainees that come with face to face training sessions. Even group chat rooms associated with e-learning may not replace this desire. Postgraduate trainees also demonstrate a variable willingness to utilise their own time to undertake this sort of work<sup>3</sup>. E-learning is an involving field and we need to continually revisit its correct application and place in training programmes. More recently Imperial College's virtual hospital on Second Life has been established

and a rigorous evaluation of game based learning in the respiratory ward is underway. However, we need to evaluate the place of each of these tools and recall that in blended learning it is important to use a mixture of opportunities for both undergraduates and postgraduates.

## REFERENCES

1. Smith SF, Roberts NJ, Partridge MR. Do newly qualified doctors use the knowledge and skills they learned as medical undergraduates? *Med Educ* 2007;41:917.
2. Nilsson M, Bolinder G, Held C, Johansson BL, Fors U, Ostergren J. Evaluation of a web-based ECG-interpretation programme for undergraduate medical students. *BMC Med Educ* 2008;8 25.
3. Smith SF, Roberts NJ, Partridge MR. What factors influence postgraduate medical trainee attitudes to computer-based learning? *Internet J MedEduc* 2010;1:2.

### **Address for Correspondence:**

#### **Prof. Martyn R Partridge**

Professor of Respiratory Medicine and  
Deputy Director of Education  
Imperial College London - United Kingdom  
E-mail: m.partridge@imperial.ac.uk